Public works policy in Portugal: a case study in unsustainability

João Joanaz de Melo

Abstract

Portugal has had a strong public works policy for centuries. In recent years, the largest environmental conflicts were focused precisely on public works. Two case studies are hereby examined. The third crossing of the Tagus at Lisbon should support the high-speed rail link between Lisbon and Madrid, plus suburban and heavy cargo trains; recently, the Government decided to add a road. But Lisbon already suffers from too much traffic and air pollution; and the cost is too high, because project-finance is not viable; instead, more and better public transportation is needed. A policy for large dams aims to create 12 new dams, supposedly to reduce GHG emissions and improve the balance of the electric network; unfortunately, those dams will hinder regional development in poor regions, destroy the last major wild rivers in Portugal and a number of social infrastructures; they would generate 2 TWh/year of electricity, about 1% of energy demand in Portugal, at a cost of 3 000 M€; in contrast, the same investment in energy-efficiency projects would save at least 8 TWh/year. In both cases, the decision process was aprioristic and disregarding of public opinion. In short, public works in Portugal remain as unsustainable as ever, environmentally, socially and economically.

Keywords: Public works, sustainability, environmental impact assessment

1. The practical meaning of sustainability

The conventional definition of sustainability, from the Brundtland Report (WCED 1987), states “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. At the time, this concept represented a major change of paradigm, from a previous concept of development that was solely based on the accretion of wealth.

The Report makes the compelling case that conservation of natural resources and social and economic development are not antagonic, but rather complementary and inter-dependent. This also represented a profound conceptual change: throughout the 19th and early 20th centuries, there was a pervading idea that Man was capable and entitled to “conquer” Nature. Even after Nature conservation became a major public issue in the mid-20th century, most people believed that environmental degradation was an inescapable (if disagreeable) cost of economic progress.

By 1992, at the United Nations Conference on Environment and Development, in Rio de Janeiro, sustainability was heralded as the new paradigm that reconciled economy, society and environment, and would shape development into the 21st century. Unfortunately, this vision proved to be much too optimistic.

There was certainly progress made in the past two decades. Sustainability now pervades the political discourse, the law and the goals of public institutions, companies and NGO alike. Environmental issues became a real concern for many citizens around the world. On paper, sustainability appears to be indeed the new paradigm; and despite all critics, so far no better paradigm has emerged.

Putting the concept to practice, however, is a very different thing. Indicators such as emission of greenhouse gases, degradation of biodiversity, number of poor and

refugees in the world, have not been curbed despite new policies and commitments. Actual application of a sustainable development has been hindered by a number of problems:

- The sustainability concept is too broad to serve as a guide on how to get there, from our present very unsustainable society;
- The sustainability concept is certainly meaningful in the long term, but conflicts may arise in the short term, and major decisions are often determined by short-term preoccupations (personal welfare in families, profit in business, expectations of voters in politics);
- Most decision-makers do not in fact understand the sustainability concept, or the underlaying relations between economics, society and environment; they often choose their preferred side of sustainability (usually social or economic) and pursue that one alone;
- Assessment of progress towards sustainability has been tentative at best. It has often taken the form of declarations, intentions, procedures and reporting of efforts rather than performance evaluation. Tools such as the Sustainable Dow-Jones Index, the ISO 14000 family of standards and impact assessment legislation are cases in point: they show a path and a method, but they do not demand actual performance. Only recently has the use of social and environmental performance indicators improved, thanks to work by organizations like OECD, UNECE, UNDP, European Environment Agency, US Environmental Protection Agency, Global Reporting Initiative and Redefining Progress, among others.
- Politics and business are, as ever, the “art of the possible”. Often, the “possible” is whatever demanded by the strongest, richest or more vocal stakeholders. The poor, the future generations and Nature have no voice of their own and precious few advocates, hence they often get no more than the “crumbles of the banquet”.

To help clarify the meaning of sustainability, two images are hereby proposed:

- “Future generations” is too diffuse a goal. We should focus on passing on to our children and grandchildren the unspoiled wonders and resources of our planet. Let our grandchildren be proud of their grandfathers;
- “Sustainability” may be seen as a tripod of social, ecologic and economic goals: *all three* legs of the tripod must be in good shape, or else the whole thing falls apart.

To uphold sustainability in the real world, the author suggests three critical guidelines:

- Leaders and decision-makers in government, business, science and NGO must be educated in sustainability, as must citizens at large (that is one goal of MSKE);
- So called “development projects” must be evaluated in the light of sustainability principles, not on mere due diligence (this is the subject of this paper);
- Market forces must be put to work in favour of social and ecologic goals, by means e.g. of internalization of costs in the economy and environmental tax reforms (this is somewhat outside the scope of this paper, but important as a reference framework).

Sustainability is a useful but also a very difficult paradigm to follow. This paper discusses the practical application of the concept to public works in Portugal.

2. Public works policy in Portugal

Public works have many benefits, but also the potential to create major environmental impacts, as indeed often happened in the past. The largest environmental conflicts in Portugal in the last twenty years were focused, not on polluting industry, but on public works (LPN, 2009).

Portugal has had a strong national public works policy for over 150 years. Railway dominated public works in the second half of the 19th century, large dams throughout the 20th century, motorways and waste treatment plants in the past few decades. Decision-makers and the general public became used to the notion that public works are of course good things, and moreover they give votes to whoever inaugurates them. Portugal is home to the Guinness Records-awarded longest "feijoada" in the world, a table set for thousands, at the inauguration of the Vasco da Gama bridge on the Tagus estuary in 1998.

It should be said that Portugal enacted in 1987 one of the first framework laws on the Environment, it is a signatory to most major environmental international conventions, has a comparatively large fraction of its territory designated under EU Natura 2000 Network (21%). Public opinion has been more and more aware of environmental issues (Eurobarometer 2005). It might thus be expected that increasing environmental legislation and awareness would help to steer modern decision-making on public works towards a more sustainable path. This may have happened in some fields, but definitely not in the matter of public works.

In the past twenty years the discourse has changed dramatically, as has the information base, but not the decision-making approach. The author and others have previously examined public works decision processes in Portugal, e.g. the second crossing of the Tagus at Lisbon, decided in 1992, inaugurated in 1998 (Melo 2000) and the Alqueva dam and irrigation project, decided in 1994, inaugurated in 2002 (Melo and Janeiro 2005). In those instances, as in many others, essential decisions were taken before proper environmental impact assessment was conducted, although major environmental and social impacts were recognized. The reasons invoked for those decisions were of social and economic character (some of them later shown to be unsupported). Those projects were among the worst environmental conflicts of the past twenty years in Portugal.

The Portuguese Government has announced plans for a number of major public works to be constructed in the next few years: 12 large dams, several motorways, the third Tagus crossing at Lisbon, the high speed railway Porto-Lisbon-Badajoz and the new Lisbon airport, among others. If they all went forward, the investment would amount to about 15 000 M€ (almost 15% of Portuguese GDP).

The official discourse is now much more concerned with environment; in fact, environment has begun to be used as an excuse to advance environment-damaging public works. This paper examines this problem focusing on two case studies currently undergoing hot debate: the National Program on Large Hydropower Dams and the Third Crossing of the Tagus at Lisbon. These case studies have been selected for a combination of reasons: (i) they are supposed to reduce energy consumption and greenhouse gas emissions — a central issue of environmental policy — but create more environmental problems than they solve; (ii) they are purported to have social and economic benefits, but that hope is contradicted by hard data; (iii) they are paradigmatic of an approach to decision-making that can be described in a nutshell as "decide first, discuss after and study later"; (iv) they are still far from closed. In short, they are unsustainable projects on all counts, but debate over them may prevent some of the foreseen damages.

3. Energy policy in Portugal

Portugal is one of the European countries with worse energy indicators (Table 1).

Table 1 — Selected energy-related indicators, 2006 (Eurostat 2008, EEA 2008, APA 2008a)

Indicator (2006)	Portugal	UE-27
Primary energy intensity (goe/€ GDP)	225	202
Energy intensity (2001 = 100%)	98%	94%
Energy intensity (1992 = 100%)	100%	80%
GHG emissions above Kyoto target (% over 1990 baseline)	13	1
Energy dependency (%)	83	54
Electricity consumption increase 2001-2006 (%.year^{-1})	3.7	1.6
GDP increase at constant prices 2001-2006 (%.year^{-1})	0.8	1.9

Improvement of Portuguese energy intensity between 2001 and 2006 was only 2% (the EU-27 improved 6% in the same period, despite difficulties in the new member states). From 1992 to 2006, Portugal kept the same energy intensity (the EU-27 improved 20% in the same period). By 2006 Portugal had greenhouse gas (GHG) emissions 40% above 1990 levels, instead of the committed 27%, one of the worst record in Europe. In the period 2001-2006 electricity consumption grew four times faster than GDP (at constant prices; it lowered in 2007 and 2008, mostly due to the economic crisis, but is expected to rise again if no structural changes are achieved).

This situation is the result of an almost absence of modern energy policies since the first oil shock in 1973 (only for brief periods, 1987-1991 and 2001-2002, were there significant efforts by the Government to create coherent energy policies). Almost all the energy policy and planning efforts in the past three decades have been directed towards alternative energy production sources, both fossil fuels (e.g. natural gas) and renewable (e.g. wind).

Energy efficiency has improved significantly in the industry in the past decades, due to cost-effective saving measures and the shut down of some large, obsolete industrial plants; it represents now 31% of final consumption. On the other hand, energy efficiency went from bad to worse in the transportation and the buildings/services sectors, which now represent respectively 38% and 31% of final consumption. The problem in transportation is a systematic policy in favour of motorways and private cars, with low investment on railway, logistics, multi-modality and public transportation. The issues in the buildings/services are bad architecture and construction (leading to a disproportionate energy consumption in climatization), low use of distributed renewables (e.g. solar collectors and firewood) and lack of demand-side energy management.

The European Union is now calling for 20% energy savings by the year 2020. Energy savings potential in Portugal, applying currently available technology, is estimated at between 30% and 40% of present consumption. Studies both at sector level and at company and household levels (e.g. BSCD Portugal 2005, Melo 2001, PCM 2008) indicate that savings of about 10% of present consumption can be achieved with relatively modest investments and payback periods up to 4 years. Much larger savings can be achieved with larger investments and payback periods, but those will need significant economic incentives to succeed.

The demonstrated potential for electricity savings amounts to about 30% of electricity consumption. Of this, measures allowing savings of at least 6% of electricity consumption (1.3% of total final energy demand) are achievable with an investment of less than 400 M€ and pay-back periods up to 3 years; measures allowing savings

of 25% of total electricity consumption (6% of total final energy demand) imply an investment of 3 500 M€ with pay-back periods up to 6 years (Madeira and Melo 2003).
Portugal approved its first National Program for Climate Change (PNAC) in 2004, reviewed in 2006 (PCM 2006). The program calls for a significant increase in energy production, especially in the electricity sector, which represents about 23% of final energy consumption and 38% of primary energy use.
The recent National Action Plan for Energy Efficiency (PNAEE: PCM 2008) sets out a number of measures to improve energy efficiency. Most measures are clearly positive, but the overall target is only 10% savings in seven years — a very low ambition, considering the existing potential. The plan does not make an estimate for overall investment cost, although it does show interesting payback periods for many of the measures. Fiscal incentives are set out in the program, but no overall estimate is provided. The Fund for Energy Efficiency will create direct public financing amounting to 30 M€/year — a ridiculously low figure when compared with the predicted investments in major public works.
Table 2 compares selected economic indicators and effects on energy balance and environment impacts, of selected energy policy options.

Table 2 — Effects of selected energy and transports policy options

Policy option	Energy balance (% of total final demand) (e)	Investment national wide (M€)	Payback time (years)	Environmental and social impact
Electricity production in new large dams (a)	+1%	3 000	70	Very negative: major protected habitat destruction, high risks, flooding of unique landscapes and heritage
3rd road crossing of Tagus at Lisbon (b)	+ 1%	700	40	Very negative: new air pollution, GHG emissions, disincentive to public transportation and to urban renewal
Efficient use of energy, all sectors (c)	- 10%	2 500	≤ 4	Very positive: major savings in fossil fuel imports and polluting emissions
	- 30%	unknown	≤ 10	
Efficient use of electricity (d)	- 1.3%	400	≤ 3	Very positive: major savings in fossil fuel imports and polluting emissions
	- 6%	3 500	≤ 6	

Notes:
(a) Estimated from INAG/DGEG/REN 2007 and published reports on the new dams; payback time based on concession horizon
(b) Estimated from RAVE/Amb&Veritas 2008 and APA 2008; investment corresponds to additional cost of the road option on a paid-for railway bridge; payback time based on concession horizon
(c) Estimated from BCSD Portugal 2005, the PNAEE and unpublished research at CENSE-FCT-UNL
(d) Adapted from Madeira and Melo 2003
(e) - represents a decrease in final energy demand. + represents an increase in final energy demand

4. Case study: the third crossing of the Tagus at Lisbon

The third crossing of the Tagus at Lisbon (TTT) is set out in the Regional Land Use Plan for the Metropolitan Area of Lisbon (PROTAML: PCM 2002). It was defined as a rail-and-road corridor between Chelas (in Lisbon) and Barreiro, with clear priority attributed to the rail component: Lisbon lacks an efficient public transportation system, suffers from too much car traffic and already has two road bridges crossing the Tagus estuary.
The proposed new bridge is to support the high-speed rail link Lisbon-Madrid, plus suburban and heavy cargo trains. By 2007, the Portuguese Government decided to add the road component immediately, supposedly to improve mobility at the Tagus

crossings and to provide access to the new airport (that should be built near Alcochete, on the southern bank of the Tagus).
The TTT project was subject to environmental impact assessment, but only the location and technical solution previously approved by the Government were put up for public consultation (RAVE/Am&Veritas 2008, APA 2008b, MAOTDR 2009a). Studies for detailed project are on going.
Before, during and after public consultation the TTT project was much criticised. The need for the rail components is consensual; critics on this component focused on the lack of study of location and tunnel options (that might cause lower environmental and social impacts) and on the absence of an overall public transportation strategy for the Metropolitan Area of Lisbon.
The road component suffered substantiated, violent criticism, on several counts:

a) The increase in road traffic caused by the new crossing will provoke a significant degradation of air quality and noise in Lisbon, with serious consequences on public health. The environmental impact statement (EIS) tried to understate this very serious impact by underestimating the traffic increase and ignoring health consequences. Some air quality stations in Lisbon already show more than 30 days a year beyond acceptable pollution levels. The second road crossing, the Vasco da Gama bridge, generated a traffic increase of 23% of total Tagus crossings within two years of its inauguration (CCRLVT 2000). It is almost certain that the third road crossing will have a similar effect. Besides the health problems due to added air pollution and noise in downtown Lisbon, this means an increase of 6% of total traffic in Lisbon, that corresponds by itself to an increase of between 0.5% and 1% of total energy demand and GHG emissions of Portugal;
b) Acessibility from Barreiro to Lisbon will of course improve. But, contrary to what is alleged in the EIS, the new road link will *not* significantly improve mobility in the region, and is certain to disrupt urban and land use planning at Barreiro and other southern bank municipalities. Experience shows that new radial motorways accelerate urban dispersion and promote individual transport, creating a strong disincentive to public transportation (CCRLVT 2000). The marginal positive effect on the 25 Abril bridge will be eroded by the increased traffic congestion in Lisbon. Public transportation options would have a far better effect at a fraction of the cost;
c) One of the supposed reasons for the third road crossing, the access to the new airport, is plainly false: the existing Vasco da Gama bridge is closer, is being used at a quarter of its capacity, so it will support easily the road link between Lisbon and the new airport for twenty or thirty years, as is clearly stated in official reports (LNEC 2008);
d) Considering, for the sake of the argument, the rail components as good and acquired, the added cost of the road component would still be high — estimates vary between 500 and 800 M€. Lusoponte, the concessionary of the existing two bridges, holds the monopoly on *any* road crossings in the Tagus estuary. The implication is that no project-finance is possible for the road component: investment on a third road crossing will have to paid in full by the Portuguese State (i.e. the taxpayers) and offered to Lusoponte to charge more tolls. The third road crossing will in fact preclude public investment on public transportation (e.g. the expansion of the Lisbon Underground and the MST, the tramway network of the southern bank). As a term of comparison, the

existing 19 km of the first phase of the MST cost less than 100 M€, and this project is eleven years behind the original schedule.

In short, the TTT is an unsustainable project. Its railway component has clear merits but needs further study; its road component is socially harmful (degrading public health and impeding mobility and urban renewal), environmentally harmful (increasing energy consumption and air pollution) and economically a disaster.

5. Case study: the promotion of large dams

For half a century the Portuguese Government has promoted the construction of dams. Current inventory runs at 165 large dams (CNPGB 2009) and many more small ones. By 2006, installed hydropower capacity in Portugal had reached 5.1 GW (Eurostat 2008). In the past decade, however, several proposed dams were refused or postponed, due to economic or environmental problems. Especially notorious was the suspension of the Foz Côa dam in 1995, due to the discovery of unique paleolithic rock engravings.

In 2004 the Portuguese Government approved the first large dam in years, the Baixo Sabor. This project raised a huge polemic, because it destroys one the most beautiful, last wild rivers in Portugal, straddling a Natura 2000 site (Figure 1). DG Environment of the European Commission kept an open conflict file for years, which was recently archived due to political pressures from the Portuguese Government and the Commission. Lawsuits are pending in the Courts against the project.

Figure 1 — The lower Sabor valley

Two already approved new dams, Baixo Sabor and Ribeiradio, together with the re-equipment of several old dams (under project or construction), will push Portuguese hydropower capacity to about 5.9 GW.

In 2007 the Government created the National Program for Large Hydropower Dams (PNBEPH: INAG/DGEG/REN 2007). The central goal of this program is to create an additional hydropower capacity of 1.1 GW, to reach a total of 7 GW by 2020. Two major reasons were alleged to advocate the program: (i) to reduce greenhouse gas emissions by "renewable" electricity production; and (ii) to balance the national electric system taking into account wind and thermal production. The program report reviewed 25 proposed new dam sites and selected 10 that together comply with the predefined target. A strategic environmental assessment was conducted, that identified the key environmental and social issues, but failed on a number of counts, being criticized by several institutions (e.g. GEOTA 2007):

a) Sustainability (social, ecological, economic) of the 1.1 GW target was not assessed;
b) Alternatives for major aims (GHG reduction and balance of the electric network) were not identified or assessed;
c) Cumulative impacts were not studied, namely: (i) increased risks for river-side populations; (ii) cumulative degradation of river habitats resulting from several dams in the same basin, especially in the Tagus and Douro basins and the Tâmega sub-basin; (iii) added risks of coastal erosion (30% of the Portuguese coastline is threatened by erosion, one of the causes being retention of sediments by dams).

A thorough analysis shows that new large dams represent a very damaging and cost-ineffective way to fulfil the proposed goals.

The 12 new large dams (the 10 in the PNBEPH plus Baixo Sabor and Ribeiradio) represent a power capacity of 1 340 MW and an average electricity production of 1.9 TWh/year. This corresponds respectively to about 8% of total currently installed capacity, 4% of total electricity production, and 1% of total energy demand in Portugal. In other words, the national relevance of the whole large dam program is minimal. In the period 2001-2006 electricity demand grew 4% per year: the large dam program is worth no more than a year of business as usual increase in consumption!

Experience has shown that priority investment in large production projects precludes investment in energy conservation.

The 12 proposed large dams will imply an investment of about 3 000 M€, with concession horizons of up to 75 years. In comparison, energy savings potential in Portugal, with current technology, is estimated at over 30% of total energy demand; the best 2 500 M€ investments in energy-saving projects (all sectors) would mean a cut about 10% in total energy demand and in total GHG emissions, with payback periods up to 4 years (Table 2). In the electric sector, the best 2.3 TWh/year savings (corresponding to 6% of electricity demand, considerably more than the whole dam program) would implicate the investment of less than 400 M€ with payback times up to 3 years (Table 2) — a much better performance than dams. In short, trying to reduce GHG emissions with dams is ineffective and makes no economic sense.

It is a fact that large hydropower facilitates the operation of electric networks. Three issues are at stake here:

a) Peak power. This is a real problem, but one that can be significantly minimized by demand management. If total electricity consumption were to be cut by 10%, with specific measures to reduce peak power (e.g. condensers to reduce

reactive energy in industry, passive climatization in buildings), existing hydropower would be quite enough;

b) Balancing the system with wind and thermal power. This means having hydropower plants with pumping ability. Total needs for this purpose have been estimated by Portuguese officials at about 1.6 GW (in public hearings: no proper studies are available). We already have an installed pumping capacity of 1.05 GW (Eurostat 2008), which will increase to 1.3 GW with the on-going upgrade of the Alqueva power plant. If proved necessary, several options exist for the remainder, that were not studied in the PNBEPH: e.g. further re-equipment of existing dams, storage in electric cars, production of hydrogen;
c) With climate change on our doorstep, it is not a good idea to depend too much on water storage for electricity (EEA 2009). It is much more intelligent to start being efficient now — especially since investments in energy efficiency are so much more interesting than large dams, economically, ecologically and socially.

When we look at ecologic and social impacts, the implications of these large dams are equally appalling:

a) Large dams are notorious for irreversible ecosystem destruction (EEB/WWF 2009). Of the 12 referred dams, only Baixo Sabor is within a Natura 2000 site, but most of the others also have significant deleterious effects on the environment (CPPE/Ecossistema 2003, IA 2004, EDP/Profico Ambiente 2008);
b) Historically, dams have often proved ineffective in promoting local development (WCD 2000). In Portugal, many old large dams are located in some of the poorest regions in the country; very few promoted any meaningful local development; in some (e.g. Vilarinho das Furnas) conflicts subsist to this day between dislodged inhabitants and the Portuguese State. Many of the dams in the PNBEPH have met with frontal opposition of local populations and authorities, because they represent unacceptable risks, because they disrupt an established way of life, or because they impede real local development projects. The municipalities of Abrantes and Constância (affected by the Almourol dam), Amarante (affected by the Fridão dam) and Mirandela (affected by the Foz Tua dam) are the most notorious opposers to the Government plans, although many others have raised objections. The impact assessment of the Foz Tua dam (the most advanced of the 10, recently approved) shows profound social impacts (APA 2009): among many other values, the fantastic Tua valley railway is to be partly flooded and put out of service, and plans for local development are put in jeopardy; the social effects of the project are dramatically illustrated in the recently featured movie “Pare, Escute, Olhe” directed by Jorge Pelicano; the final decision on the dam (MAOTDR 2009b) blithely disregards local as well as national concerns.

In short, the large dam policy is completely unsustainable: it is socially harmful (impeding local development projects and destroying unique heritage), environmentally harmful (destroying rare river ecosystems) and economically wasteful, there being better alternatives to fulfil the proposed goals.

6. Conclusion

The decision process in the examined case studies (third crossing of the Tagus at Lisbon and promotion of new large dams) was found to be aprioristic and with little attention to public participation.
The purported goals are barely achieved or in some cases are contradicted by the proposed public works. We find that, although technical information is abundant, the political decisions are often not supported by sound technically reasoning. We find moreover that the financial equation is, to say the least, uninteresting for the Portuguese Sate.
The Government sees as a great virtue of the proposed works, the commissions and employment in the construction business, deeply affected by the economic crisis; but even on this count, it can be argued, there are more interesting alternatives (e.g. public transportation or urban renewal projects).
In short, despite the rhetoric, public works in Portugal remain as unsustainable as ever, on all the three domains: environment, society and economy.
If we want sustainability to be a reality, we should be prepared to fight for it, because, despite the economic and ecologic crises, too many interests are willing to fight for the unsustainable business as usual.

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Author: João Joanaz de Melo
(PhD Environmental Engineering, Assistant Professor)
CENSE - Center for Environmental and Sustainability Research
Dept. Environmental Science and Engineering
Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa
2829-516 CAPARICA
PORTUGAL
www.dcea.fct.unl.pt/cense
E-mail: jjm@fct.unl.pt
Phone: +351-212948374 (sec); +351-21 212948300 ext. 10121 (gab)
Fax: +351-212948554